

IN THE CLAIMS

This listing of the claim will replace all prior versions and listings of claim in the present application.

Listing of Claims

Claims 1-12 (canceled).

13. (previously presented) In a computer system which includes a plurality of storage subsystems being sequentially concatenated to a host computer, and which performs remote copy between said storage subsystems,

a first storage subsystem comprising:

an interface which receives a status information acquisition command and which sends status information from the first storage subsystem to a second storage subsystem that is located on a nearer side of the first storage subsystem relative to the host computer and connected to the first storage subsystem;

an outgoing status information storage unit which stores said status information to be sent to said second storage subsystem;

a target storage subsystem judgment unit which judges whether a target storage subsystem identified in the status information acquisition command received by said interface is the first storage subsystem;

a command downstream sending unit which sends said status information acquisition command to a third storage subsystem that is located on a farther side of the first storage subsystem relative to the host computer and connected to the first storage subsystem, when said target storage subsystem judgment unit judges that

the first storage subsystem is not said target storage subsystem from which said status information is to be acquired;

a self status information acquisition unit which acquires the status information of the first storage subsystem and which stores the acquired status information to be sent to the second storage subsystem into said outgoing status information storage unit, when said target storage subsystem judgment unit judges that the first storage subsystem is said target storage subsystem from which said status information is to be acquired; and

a downstream status information acquisition unit which receives the status information from said third storage subsystem and which stores the received status information to be sent to the second storage into said outgoing status information storage unit,

wherein, after said self status information acquisition unit or said downstream status information acquisition unit stores said status information into said outgoing status information storage unit, said interface sends said status information stored.

14. (previously presented) A first storage subsystem according to Claim 13, further comprising:

a concatenation position judgment unit which judges a concatenation position of the first storage subsystem based on information stored in said status information acquisition command received from said upstream storage subsystem,

wherein when said concatenation position judgment unit judges that the first storage subsystem is a storage connected to said host computer, then, said interface

sends the status information stored in said status information storage unit to said host computer.

15. (previously presented) A first storage subsystem according to Claim 14, wherein when said target storage subsystem judgment unit judges that said target storage subsystem is all of said plurality of storage subsystems including the storage subsystem sequentially concatenated from said host computer, and said concatenation position judgment unit judges that the first storage subsystem is not a storage subsystem concatenated at a farthest position relative to said host computer among said plurality of storage subsystems sequentially concatenated, then, said command downstream sending unit sends said status information acquisition command to the third storage subsystem connected to the storage subsystem,

wherein said self status information acquisition unit adds the acquired status information of the first storage subsystem to the status information that is received by said downstream status information acquisition unit from said third storage subsystem and stored in said outgoing status information storage unit, and then, said self status information acquisition unit stores resultant status information to be sent to the second storage into said outgoing status information storage unit, and

wherein after said self status information acquisition unit stores said status information into said outgoing status information storage unit, said interface sends said status information.

16. (previously presented) A storage subsystem according to Claim 15, wherein when said target storage subsystem judgment unit judges that said target storage subsystem is all of said plurality of storage subsystems including the storage subsystem sequentially concatenated from said host computer, and said concatenation position judgment unit judges that the first storage subsystem is not the storage subsystem concatenated at a farthest position seen from said host computer among said plurality of storage subsystems sequentially concatenated, then, said command downstream sending unit instructs said self status information acquisition unit to acquire the status information of the first storage subsystem and to store the acquired status information to be sent to the second storage into said outgoing status information storage unit.

17. (previously presented) A storage subsystem according to Claim 16, further comprising:

an acquired information judgment unit which judges whether status information whose acquisition is requested by the status information acquisition command received is newest status information,

wherein when said acquired information judgment unit judges that the newest status information is not requested, said concatenation position judgment unit judges that the first storage subsystem is a storage subsystem, and said outgoing status information storage unit holds the status information, then, said interface sends the held status information to the host computer without waiting for said self status

information acquisition unit or said downstream status information acquisition unit to store status information into said outgoing status information storage unit.

18. (currently amended) In a computer system which includes a plurality of storage subsystems that are sequentially concatenated to a host computer and performs remote copy between said plurality of storage subsystems, a first storage subsystem comprising:

an interface which receives a status information acquisition command and which sends status information from and to a second storage subsystem that is located on a nearer side of the storage subsystem relative to the host computer and connected to the first storage subsystem;

an outgoing status information storage unit which stores said status information to be sent to said second storage subsystem;

a concatenation position judgment unit which judges a concatenation position of the first storage subsystem based on information stored in said status information acquisition command received from said second storage subsystem; and

a status information acquisition unit,

wherein said status information acquisition unit acquires the status information of the first storage subsystem at status information acquisition time intervals stored in the status information acquisition command, to store the acquired status information into the outgoing status information storage unit, when said concatenation position judgment unit judges that the first storage subsystem is a

storage subsystem located at a farthest position in concatenation order relative to the host computer; and

wherein said status information acquisition unit acquires the status information of the storage subsystem at a time of receiving status information from a third storage subsystem connected to and located on a farther side of the storage subsystem relative to the host computer, and adds the status information of the first storage subsystem to the received status information of said third storage subsystem, to store resultant status information to the status information storage unit, and

wherein when the concatenation position judgment unit judges that the storage subsystem in question is not a storage subsystem connected directly to the host computer, then, said interface sends all of said status information stored in the status information storage unit to said upstream storage subsystem.

19. (currently amended)A computer system comprising:

a host computer;

a plurality of storage subsystems which are sequentially concatenated to said host computer and remote copy is performed between said plurality of storage subsystems,

wherein a first storage subsystem comprising:

an interface which receives status information acquisition command and which sends status information to a second storage subsystem that is located on a

nearer side of the first storage subsystem relative to the host computer and connected to the first storage subsystem,

an outgoing status information storage unit which stores said status information to be sent to said second storage subsystem,

a target storage subsystem judgment unit which judges whether a target storage subsystem identified in the status information acquisition command received through said interface is the first storage subsystem,

a command downstream sending unit which sends said status information acquisition command to a third storage subsystem that is located on a farther side of first storage subsystem relative to the host computer and connected to first storage subsystem, when said target storage subsystem judgment unit judges that the first storage subsystem is not said target storage subsystem from which said status information is to be acquired,

a self status information acquisition unit which acquires the status information of the storage subsystem and which stores the acquired status information to be sent to the second storage subsystem into said ongoing status information storage unit, when said target storage subsystem judgment unit judges that the first storage subsystem is said target storage subsystem from which said status information is to be acquired, and

a downstream status information acquisition unit which receives the status information from said third storage subsystem and which stores the received status information to be sent to the second storage into said outgoing status information storage unit,

wherein after said self status information acquisition unit or said downstream status information acquisition unit stores said status information into said outgoing status information storage unit, said interface sends said status information stored in said outgoing status information storage unit;

wherein said host computer comprises:

a status information acquisition command generation unit which generates said status information acquisition command,

a status information acquisition unit which receives status information from said plurality of storage subsystems, and

a remote copy adjustment unit which generates information for adjusting a remote copy according to said status information held in said status information holding unit.

20. (currently amended) In a computer system which includes a plurality of storage subsystems being sequentially concatenated to a host computer and performs remote copy between said storage subsystems, a status information acquisition method for acquiring status information of a plurality of storage subsystems comprising:

a command receive step in which a first storage subsystem receives a status information acquisition command from a second storage subsystem that is connected to and located on a nearer side of the first storage subsystem relative to the host computer;

a target storage subsystem judgment step in which the first storage subsystem analyzes the received status information acquisition command, to judge whether the first storage subsystem is a target storage subsystem from which status information is to be acquired based on said status information acquisition command; and

a status information acquisition/sending step including the sub-steps of:

when it is judged in said target storage subsystem judgment step that the first storage subsystem is the target storage subsystem, then, acquiring, by the first storage subsystem, the status information of the first storage subsystem and sending the acquired status information to said second storage subsystem, and

when it is judged in said target storage subsystem judgment step that the storage subsystem is not the target storage subsystem, then, sending, by the first storage subsystem, the status information acquisition command received in said command receiving step to a third storage subsystem connected to and located on a farther side of the first storage subsystem relative to the host computer, and thereafter, when status information of said third storage subsystem is received from the third storage subsystem, sending, by the first storage subsystem, the received status information to the second storage subsystem.

21. (currently amended) In a computer system which includes storage subsystems being sequentially concatenated in a sequence, a status information acquisition method for acquiring status information of said subsystems comprising:

a command receiving step in which a first storage subsystem receives a status information acquisition command from a second storage subsystem that is connected to and located on a nearer side of the first storage subsystem relative to the host computer;

a self position judgment step in which the storage subsystem analyzes the received status information acquisition command and judges whether the first storage subsystem is a third storage concatenated at a farthest position in said sequence relative to the host computer; and

a status information acquisition/sending step including the sub-steps of:

when it is judged in said self position judgment step that the first storage subsystem is the end storage subsystem, then, acquiring, by the first storage subsystem, the status information of the first storage subsystem and sending the acquired status information to second subsystem connected to the first storage subsystem, and

when it is judged that the first storage subsystem is not the end storage subsystem, then, sending, by the first storage subsystem, the status information acquisition command received in said command receiving step to a third storage subsystem connected to and located on a farther side of the first storage subsystem relative to the host computer, and thereafter, when status information is received from said third storage subsystem, adding, by the first storage subsystem, the status information of the first storage subsystem to the status information received from the third storage subsystem to obtain new status information, and sending the new status information to the second storage subsystem.

22. (currently amended) In a computer system which includes a plurality of storage subsystems being sequentially concatenated to a host computer and performs remote copy between said plurality of storage subsystems, a status information monitoring method for monitoring remote copy status of at least one of the storage subsystems ~~in sequence~~ sequentially concatenated to first storage subsystems directly coupled to a host computer, said status information monitoring method comprising the steps of:

generating a status acquisition command for acquiring, at regular time intervals, remote copy status information of all the storage subsystems constituting a specific sequence connected to the host computer;

sending the generated status acquisition command to the first storage subsystem;

receiving the sent status acquisition command in the first storage subsystem;

when the received status acquisition command is a command for acquiring the status information of the sequence to which the first storage subsystem belongs, sending the status acquisition command to a second storage subsystem connected to the first storage subsystem;

sending the received command at said second storage subsystem to a third storage subsystem connected at an end farthest from the host computer;

acquiring said status information to be sent to the second storage subsystem connected to the third storage system, ~~in the third storage system connected at the~~

end according to the received status acquisition command, in the third storage system connected at the end;

judging, in the third storage subsystem, whether or not the storage subsystem is the first storage subsystem; and

when it is judged that the storage subsystem is not a remote storage subsystem, then, repeating the first storage subsystem, sending the status information of the third storage subsystem from the third storage subsystem to the second storage subsystem;

receiving, in the second storage subsystem, the status information of the third storage subsystem;

adding, in the second the status information of the storage subsystem, the status information of the second storage subsystem to the received status information of the ~~to the status information acquired from a third storage subsystem;~~
~~or a second storage subsystem connected to the storage, and sending resultant status information to the second storage subsystem or the first storage system connected to the storage subsystem or the first storage system;~~

judging, in the second storage subsystem, whether or not the storage subsystem is the first storage subsystem,

~~until said storage subsystem becomes a first storage subsystem, and the first storage subsystem holds the status information, and~~

~~when it is judged that the storage subsystem is not at the first storage subsystem, sending the received then holding the acquired status information of the~~

third storage subsystem and the second storage subsystem from the second storage subsystem to the first storage subsystem;

receiving, in the first storage subsystem, the status information of the third storage subsystem and the second storage subsystem;

adding, in the first storage subsystem, the status information of the first storage subsystem to the received status information of the third storage subsystem and the second storage subsystem;

judging, in the first storage subsystem, whether or not the storage subsystem is the first storage subsystem;

when it is judged that the storage subsystem is the first storage subsystem, holding resultant status information;

generating, in the host computer, a status information acquisition command for acquiring remote copy status information of all the storage subsystems constituting a specific sequence connected to the host computer;

sending, in the host computer, the generated status information acquisition command to said first storage subsystem;

receiving, in the first ~~storage subsystem~~ computer, the sent status information acquisition command;

sending, from the first storage subsystem, the resultant status information ~~acquired~~ held by the first storage subsystem to the host computer when a sequence designated by said command as a sequence from which status information is to be acquired is a sequence to which the first storage subsystem belongs; and

~~receiving to be held~~ the sent status information in the host computer.

23. (new) In a computer system includes a plurality of storage subsystems which are sequentially concatenated to a host computer and performs remote copy between said plurality of storage subsystems, a first storage subsystem comprising:

a memory; and

an arithmetic unit which receives a status information acquisition command from a second storage subsystem that is located on a nearer side of the first storage subsystem seen from the host computer and connected to the first storage subsystem, judges whether a target storage subsystem from which said status information to be acquired specified in said status information acquisition command is the first storage subsystem, sends said status information acquisition command to a third storage subsystem that is located on a farther side of the first storage subsystem, when it is judged that the first storage subsystem is said target storage subsystem from which said status information is to be acquired, receives the status information into said memory, and sends the status information stored in said memory to said second storage subsystem.

24. (new) A computer system comprising:

a host computer; and

a plurality of storage subsystems which are sequentially concatenated to said host computer and remote copy is performed between said plurality of storage subsystems,

wherein a first storage subsystem comprises:

an interface which receives a status information acquisition command and sends status information from and to a second storage subsystem that is located on a nearer side of the first storage subsystem seen from the host computer and connected to the first storage subsystem,

an outgoing status information storage unit which stores said status information to be sent to said second storage subsystem,

a concatenation position judgment unit which judges a concatenation position of the first storage subsystem based on information stored in said status information acquisition command received from said second storage subsystem, and

a status information acquisition unit which acquires status information of the first storage subsystem at status information acquisition time intervals stored in the status information acquisition command, to store the acquired status information into the outgoing status information storage unit, when said concatenation position judgment unit judges that the first storage subsystem is a storage subsystem located at a farthest position in concatenation order seen from the host computer and acquires status information of the storage subsystem at a time of receiving status information from a third storage subsystem connected to and located on a farther side of the storage subsystem in question seen from the host computer, and which adds the status information of the first storage subsystem to the received status information of said third storage subsystem, to store resultant status information to the status information storage unit,

wherein when the concatenation position judgment unit judges that the first storage subsystem is not a storage subsystem connected directly to the host

computer, then said interface sends said status information stored in the status information storage unit to said upstream storage subsystem, and

wherein said host computer comprises:

a status information acquisition command generation unit which generates a status information acquisition command,

a status information acquisition unit which receives status information from said plurality of storage subsystems,

a status information holding unit which holds the status information acquired by said status information acquisition unit, and

a remote copy adjustment unit which generates information for adjusting remote copy according to said status information held in said status information holding unit.